THE ALPINE-SUBALPINE FLORA OF NORTHEASTERN MÉXICO

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ABSTRACT

A floristic list of angiosperms found above or in association with timberline vegetation in northeastern México is presented. The flora doubles the number of alpine-subalpine species previously reported for the region, and extends the known distribution of this vegetation type. Included are 170 species, representing 119 genera and 46 families.

RESUMEN

Se presenta un listado floristico de angiospermas que existen en los límites arboreos de zonas altas en el nordeste de México. Se reconoce el doble del numero de elementos alpino-subalpinos reportados para la region en trabajos anteriores, y se extiende la distribucion conocida de este tipo de vegetacion. Se reconocen 170 especies, 119 generos y 46 familias.

The isolated presence of timberline vegetation in northeastern México was recognized by Muller (1939), and has since been subjected to few studies. Beaman & Andresen (1966) characterized in detail the ecological and floristic aspects of Cerro Potosí, Nuevo Leon, one of several prominent peaks in the region. Alpine meadow dominated by chamaephytes and hemicryptophytes is encountered on Cerro Potosí from 3620 – 3700 m, and subalpine meadow composed primarily of erect forbs and cespitose grasses is found as low as 3460 m. A unique form of subalpine vegetation dominated by dense, shrubby stands of *Pinus culminicola* Andresen & Beaman often intercedes the *Pinus hartwegii* Benth. forests and alpine meadow as low as 3450 m. Based on the above characterizations of alpine and subalpine zones, and their associated elevational limits, one would suspect these vegetation types to be more widespread, as the region includes several ranges that reach from 3450 – 3700 m. Contrary to suggestions that Cerro Potosí is the sole center for alpine-subalpine vegetation in northeastern México (Beaman & Andresen, 1966), recent explorations of high elevational ranges revealed a more complex and widespread timberline flora.

The timberline vegetation of northeastern México includes three discreet centers (Fig. 1). The northern center begins 36 km east of Saltillo in the northernmost extensions of the Sierra Madre Oriental. The closely spaced Sierra Coahuilon, Sierra La Marta and Sierra La Viga provide refugia for alpine or subalpine elements along their ridges and upper, southern ex-

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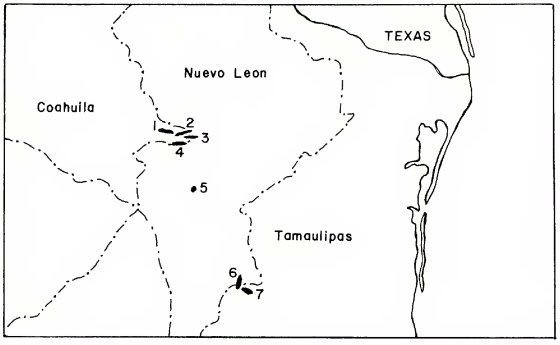

	LAT. N.	LONG. W	ALTITUDE
[1]SIERRA LA VIGA	25 21'	100 33'	3700 m
[2]SIERRA POTRERO DE ABREGO	25 19'	100 22'	3460 m
[3]SIERRA COAHUILON	25 14'	100 20'	3500 m
[4]SIERRA LA MARTA	25 12'	100 22'	3700 m
[5]CERRO POTOSI	24 53'	100 15'	3700 m
[6]SIERRA PENA NEVADA	23 48'	99 51'	3640 m
[7]SIERRA BORRADO	23 47'	99 51'	3460 m

FIG. 1. Distribution of alpine-subalpine sites explored in northeastern México, including their altitudes, latitudes and longitudes. Underlined localities included in floristic list.

posures from 3400 – 3700 m. The second center for timberline vegetation, Cerro Potosí, occurs as a singular peak 38 km to the south of Sierra La Marta. Present day maps (DETENAL, Joint Operations Graphic maps, Department of Commerce Operational Navigation Charts) generally place Cerro Potosí at 3700 m, about equal in elevation to Sierra La Marta, the closest point of alpine-subalpine contact to the north. The third and southern center for timberline vegetation is located 125 km south of Cerro Potosí, including Sierra Borrado and Sierra Peña Nevada (Fig. 1). The latter peaks are generally reported to reach 3400 and 3650 m, respectively. As predicted by Muller (1939), Sierra Peña Nevada also provides satisfactory habitat for shade intolerant, timberline species, which are distributed sporadically with stunted individuals of *Pinus hartwegii* along the ridges

and uppermost southeast and southwest exposures of the range. Sierra Borrado, though excluded in the floristic list due to its lack of an established subalpine vegetation, deserves mention since many subalpine species are encountered on its upper and relatively open, eastern exposures.

Fieldwork was undertaken during summer months from 1984 – 86. All sites were visited at least once at the beginning of the flowering season (June), during the peak of the flowering season (July – August), and during the fruiting months (September – October). In addition to the author's collections, complementary material was studied at TEX, where a significant collection of the Northeast Mexican flora has been accumulated in recent years. Near complete sets of the author's collections are deposited at MEXU and TEX, and incomplete sets are at UAT, WIS and XAL.

While Beaman & Andresen (1966) reported 81 species for Cerro Potosí, the updated list includes 170 species for the alpine-subalpine vegetation of northeastern México. A few additional species are added to the list for Cerro Potosí, and most species previously listed as endemic to the peak are present and often prevalent in the other timberline refugia. A forthcoming study will analyze in more depth, based in part on the distributional data presented here, the phytogeographic relationships among various alpine-subalpine peaks of northern México (McDonald, in press).

Floristic List

	PN	PO	MA	CO	VI
AGAVACEAE					
Agave macroculmis Tod.	X	X			
BORAGINACEAE					
Hackelia leonotis I. M. Johnston		X			X
Lithospermum sordidum Brand.	X	X			
Onosmodium dodrantale I.M. Johnston	X	X	X		
CAMPANULACEAE					
Campanula rotundifolia L.	X	X	X	X	X
CAPRIFOLIACEAE					
Symphoriocarpus microphyllus H.B.K.	X	X	X	X	X
CARYOPHYLLACEAE					
Arenaria lanuginosa Rohrb.	X	X	X	X	X
Arenaria cf. *lycopodioides* Willd. ex Schlecht.	X				X
Arenaria cf. *oresbia* Greenm.	X	X	X	X	X
Cerastium brachypodum (Engel. ex A. Gray) Robins.	X	X	X	X	

PN = Pena Nevada, PO = Cerro Potosí, MA = Sierra La Marta, CO = Sierra Coahuilon, VI = Sierra La Viga

(Floristic List continued)	PN	PO	MA	CO	VI
Stellaria cuspidata Willd.	X	X		X	X
Silene laciniata Cav.	X		X	X	X
CELASTRACEAE					
Paxistima myrsinites Raf.	X		X	X	X
COMMELINACEAE					
Commelina tuberosa L.	X				
COMPOSITAE					
Achillea millefolium L.		X	X	X	X
Ageratina oreithales (B.L. Rob.) B. Turner	X	X	X		X
Ageratina campylocladia (B.L. Rob.) B. Turner				X	
Antennaria parvifolia Nutt.		X			
Astranthium beamanii De Jong		X			
Bidens triplinervia H.B.K.	X		X	X	X
Brickellia nesomii B. Turner	X	X		X	
Brickellia coahuilensis (A. Gray) Harcombe & Beaman	X		X	X	X
Brickellia hintoniorum B. Turner			X	X	X
Chaetopappa parryi A. Gray	X				X
Cirsium novoleonense G. Nesom (in prep)	X	X	X	X	X
Dugaldia pinetorum (Standl.) Bierner		X			
Erigeron hintoniorum Nesom (in prep)		X	X	X	
Erigeron onofrensis Nesom (in prep)	X				
Erigeron potosinus Standl.		X			X
Erigeron pubescens H.B.K.		X	X		X
Erigeron wellsii Nesom	X				
Gnaphalium hintoniorum B. Turner (in prep)	X	X	X	X	X
Grindelia inuloides Willd.	X	X		X	X
Helianthella quinquenervis (Hook.) Gray		X		X	
Heterotheca mucronata Harms ex Turner			X		
Hieracium dysonymum Blake	X	X	X	X	
Hymenoxys ursina Standl.		X			X
Hymenopappus hintoniorum B. Turner				X	
Machaeranthera odysseus Nesom	X				
Senecio bellidifolius H.B.K.	X				
Senecio carnerensis Greenm.	X	X	X	X	X
Senecio coahuilensis Greenm.	X	X	X	X	X
Senecio hintoniorum B. Turner		X			
Senecio loratifolius Greenm.	X	X	X	X	X
Senecio madrensis A. Gray	X	X	X	X	X
Stevia pilosa Lag.	X				
Tagetes lucida Cav.	X				
Taraxacum officinale Weber in Wigg.			X	X	X
Thelesperma graminiformis (Sherff) Melchert (in prep)	X				

(Floristic List continued)	PN	PO	MA	CO	VI
Thelesperma mulleri (Sherff) Melchert (in prep)		X			
Zaluzania megacephala Sch.-Bip.	X				
CRASSULACEAE					
Sedum chrysicaulum McDonald (in prep)	X	X	X	X	X
Sedum papillicaulum Nesom (in prep)	X				
Sedum clausenii Nesom (in prep)			X	X	X
Villadia cuculata Rose	X	X		X	X
Villadia misera (Lindl.) R. Clausen			X	X	
Echeveria cf. *simulans* Rose			X	X	
CRUCIFERAE					
Draba helleriana Greene	X	X	X	X	X
Erysimum capitatum Greene	X	X	X	X	X
Pennelia longifolia (Benth.) Rollins	X		X	X	
Thlaspi mexicanum Standl.	X	X			
CUPRESSACEAE					
Juniperus monticola Martinez	X	X	X		
CYPERACEAE					
Carex bella Bailey		X	X		
Carex orizabae Liebm.		X			
Carex schiedeana Kunze	X				
ERICACEAE					
Arctostaphylos pungens H.B.K.	X				
EUPHORBIACEAE					
Euphorbia beamanii M.C. Johnston	X	X	X	X	X
FAGACEAE					
Quercus greggii (A. DC.) Trel.	X		X		
Quercus spp.	X				
FUMARIACAE					
Corydalis pseudomicrantha Fedde		X	X	X	
GARRYACEAE					
Garrya ovata Benth. var. *ovata*		X	X	X	X
GENTIANACEAE					
Gentianella amarella (L.) Borner		X			
Frasera speciosa Dougl.			X	X	X
Halenia alleniana Standl. ex Wilbur	X				
GERANIACEAE					
Geranium seemanii Peyr.	X	X	X	X	X
Geranium crenatifolium H.E. Moore	X	X			X
GRAMINEAE					
Blepharoneuron tricholepis (Torr.) Nash	X	X			
Brachypodium pringlei Scribn. ex Beal.	X		X	X	X
Bromus anomalus Rupr. ex Fourn.	X	X	X	X	X
Calamagrostis purpurascens R. Br.		X	X		
Deschampsia flexuosa (L.) Trin.		X			
Elymus trachycaulus (Link.) Gould ex Shinners		X	X	X	X

(Floristic List continued)	PN	PO	MA	CO	VI
Festuca amplissima Rupr.			X		
Festuca hephaestophila Nees ex Steud.	X	X		X	X
Festuca pringlei St.-Yves		X			
Festuca rosei Piper	X		X		
Festuca rubra L.	X		X	X	X
Festuca thurberi Vasey			X		X
Festuca hintoniana E. Alexeev		X	X		
Kohleria pyramidata Beauv.	X			X	
Muhlenbergia rigens (Benth.) Hitch.	X				
Muhlenbergia virescens Trin.	X		X		X
Muhlenbergia wolfii (Vasey) Rydb.	X				
Phleum alpinum L.		X			
Piptochaetium virescens (H.B.K.) Parodi	X				
Poa mulleri Swallen		X			
Poa pratensis L.				X	X
Poa strictiramea A. Hitch.			X		X
Trisetum spicatum (L.) Richter	X	X	X	X	X
HYDROPHYLLACEAE					
Nama whalenii Bacon (in prep)				X	
Nama dichotoma (R. & P.) Choisy	X				
Phacelia heterophylla Pursh	X	X	X	X	X
Phacelia platycarpa Spreng.	X	X	X		
IRIDACEAE					
Sisyrinchium schaffneri Wats.	X	X			
Sisyrinchium sp. nov.	X				
LABIATAE					
Agastache palmeri (B.L. Rob.) Standl. var. *leonensis* R. Sanders			X	X	X
Hedeoma costatum A. Gray	X				
Salvia macellaria Epl.	X	X	X	X	X
Salvia unicostata Fern.	X				
Salvia sp. nov. McDonald (in prep)				X	
Scutellaria potosina Brandeg.	X				
Stachys kerrii Benth.	X	X		X	
LEGUMINOSAE					
Astragalus purpusii M.E. Jones	X	X	X	X	X
Trifolium schneideri Standl.	X	X			
Vicia humilis H.B.K.		X			
Vicia ludoviciana Nutt.	X	X			X
Lupinus cacuminis Standl.	X	X	X	X	X
LILIACEAE					
Calochortus marcellae Nesom	X				
Schoenocaulon sp. nov. Frame (in prep)	X				
Maianthemum stellatum (L.) Link		X	X	X	
Zigadenus virescens (H.B.K.) MacBride	X	X	X	X	X
LINACEAE					
Linum lewisii Pursh	X	X	X	X	X

(Floristic List continued)	PN	PO	MA	CO	VI
ONAGRACEAE					
Epilobium angustifolium L. ssp. *circumvagum* Mosquin			X	X	
Oenothera primimervis A. Gray	X				
Oenothera tetraptera Cav.				X	
PAPAVERACEAE					
Argemone subalpina McDonald (in prep)	X				
LORANTHACEAE					
Arceuthobium vaginatum (Willd.) Prest. ssp. *vaginatum*	X			X	X
PINACEAE					
Pinus culminicola Andresen & Beaman		X	X		X
Pinus hartwegii Benth.	X	X	X	X	
Picea mexicana M. Martinez			X		
POLEMONIACEAE					
Polemonium pauciflorum Wats.	X	X	X	X	X
POLOGONACEAE					
Eriogonum jamesii Benth. var. *undulata* S.G. Stokes	X	X	X	X	X
PRIMULACEAE					
Androsace septentrionalis L. var. *puberulenta* (Rydb.) Kunth	X	X	X	X	
RANUNCULACEAE					
Aquilegia elegantula Greene	X		X		
Delphinium valens Standl.	X	X	X	X	X
Ranunculus praemorsus H.B.K. ex DC.	X	X	X	X	X
RHAMNACEAE					
Ceanothus buxifolius Willd. ex Schult.	X		X	X	X
Ceanothus greggii Gray			X		
ROSACEAE					
Alchemilla procumbens Rose	X				
Fragaria californica Newberry	X	X			
Holodiscus dumosus (Nutt.) Heller	X	X	X	X	
Potentilla leonina Standl.		X		X	
Potentilla propinqua Rydb.				X	
Potentilla sp. nov. Nesom (in prep)	X				
Rubus idaeus L.		X	X	X	
RUBIACEAE					
Galium uncinulatum DC.	X	X			
Hedyotis wrightii (A. Gray) Fosberg	X				
SALICACEAE					
Populus tremuloides Michx.				X	X
SAXIFRAGACEAE					
Heuchera mexicana Schaffner	X	X			
Heuchera sanguinea Engelm.	X	X	X		
Philadelphus maculatus (Hirch.) Hu			X		
Ribes neglectum Rose		X	X	X	
Ribes microphyllus H.B.K.			X	X	X

(Floristic List continued)	PN	PO	MA	CO	VI
SCROPHULARIACEAE					
Castilleja bella Standl.	X	X			
Castilleja scorzonerifolia H.B.K.	X	X	X	X	X
Penstemon barbatus Roth	X	X	X	X	X
Penstemon leonensis Straw	X	X	X	X	X
SOLANACEAE					
Solanum verrucosum Schlecht.	X	X		X	
Solanum macropilosum Correll	X				
Physalis orizabae Dun.	X	X			
UMBELLIFERAE					
Arracacia schneideri Mathias & Constance		X	X	X	
Arracacia ternata Mathias & Constance	X				
Arracacia tolucensis Hemsl.			X	X	
Eryngium sp.	X				
Tauschia hintoniorum Constance & Affolter	X		X	X	X
Tauschia madrensis Coult. & Rose		X	X	X	X
URTICACEAE					
Urtica cf. spirealis Blume		X		X	
VALERIANACEAE					
Valeriana sorbifolia H.B.K. var. *sorbifolia*	X				
VERBENACEAE					
Verbena elegans H.B.K.	X	X		X	
VIOLACEAE					
Viola galeanaensis M.S. Baker	X				

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